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IS 10227 (1997): Fishing vessels - Trawl winches [TED 18:
Inland, Harbour Crafts and Fishing Vessels]

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भारतीय मानक
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(पहला पुनरीक्षण)

Indian Standard
FISHING VESSELS — TRAWL WINCHES —
SPECIFICATION
(*First Revision*)

ICS 47.020.50

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Fishing Vessels Sectional Committee had been approved by the Transport Engineering Division Council.

This Indian standard was first published in 1982, when only right-hand single drum trawl winches were illustrated. In this revision new clauses regarding requirements of protection and basic calculations have been added. Also, right-hand double drum and left-hand and central single and double drum trawl winches have been illustrated. Since a separate Indian Standard IS 12719 : 1989 'Shipbuilding — Deck machinery — General requirements' has been published, only the specific requirements have been retained/stipulated in the revised version and reference has been made to IS 12719 : 1989 for general requirements. With a view to harmonize the standard brakes and braking, performance and testing requirements have been brought in line with ISO 6115 and also, references have been made to various parts and sections of IS 10242 'Electrical installations in ships' and IS 12063 : 1987 'Classification of degrees of protection provided by enclosures of electrical equipment'.

While preparing this standard considerable assistance has been derived from ISO 6115 : 1988 'Shipbuilding — Trawl winches'.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

**FISHING VESSELS — TRAWL WINCHES —
SPECIFICATION**

(First Revision)

1 SCOPE

1.1 This Indian Standard specifies requirements and characteristics of single-drum and double-drum trawl winches with electric, electro-hydraulic, hydraulic diesel or externally powered drive.

1.2 The winches are used for hauling-in, paying-out and holding the trawl rope while fishing by means of trawling fishing gear.

1.3 When equipped with additional auxiliary drums, they may also be used for auxiliary operations when hauling-in, paying-out and emptying the trawl net.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
2581 : 1989	Round strand galvanized steel wire ropes for shipping purposes (<i>third revision</i>)
8650 (Part 1) : 1989	Shipbuilding—Deck machinery—Glossary of terms and graphical symbols : Part 1 Deck machinery (<i>first revision</i>)
10242	Electrical installations in ships:
(Part 1/Sec 1) : 1982	General, Section 1 Definitions and general requirements
(Part 2/Sec 1) : 1982	System design, Section 1 General
(Part 2/Sec 2) : 1983	System design, Section 2 Protection
(Part 3/Sec 1) : 1983	Equipment, Section 1 Generators and motors

<i>IS No.</i>	<i>Title</i>
(Part 3/Sec 2) : 1984	Equipment, Section 2 Switchgear and controlgear assemblies
(Part 3/Sec 12) : 1986	Equipment, Section 12 Choice and installation of cables for low voltage systems
12063 : 1987	Classification of degrees of protection provided by enclosures of electrical equipment
12719 : 1989	Shipbuilding — Deck machinery — General requirements

3 DEFINITIONS

For the purposes of this Indian Standard, the definitions given in IS 8650 (Part 1) and the following definitions shall apply.

3.1 Design Torque

Driving torque available at the drum, resulting from the drum load applied to the half-length rope nominal trawl rope winding diameter, for a single-drum winch.

NOTE — For a double-drum winch, the design torque is twice the design torque of a single-drum winch.

3.2 Double-drum Trawl Winch

Winch equipped with two main trawl rope drums, double in-line or waterfall, provided with a common drive (see Fig. 1 : L2, R2, C2, L2W or R2W).

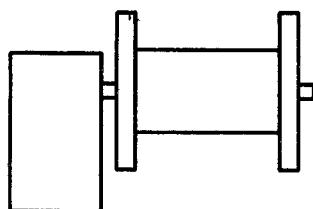
3.3 Drum Load

Maximum trawl rope tension, measured at the drum exit a trawl rope being hauled-in at the nominal speed and being wound onto the appropriate nominal trawl rope winding diameter of the drum.

3.4 Nominal Size

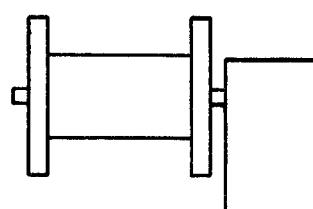
Drum load on the trawl rope drum, in tonnes, as stated in Table 1, for a single-drum trawl winch.

NOTE — For a double-drum winch, the nominal size corresponds to twice the drum load stated in Table 1.



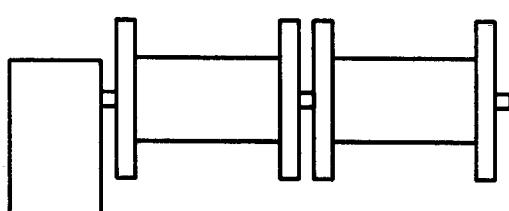
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L1



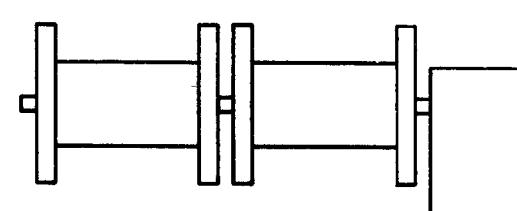
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R1



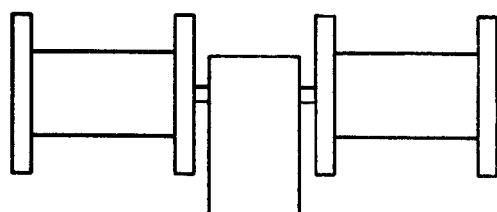
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L2



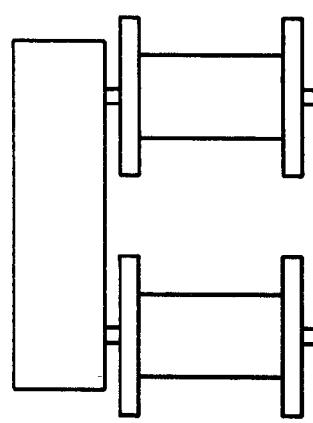
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R2



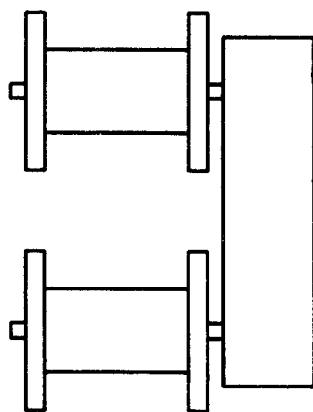
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C2



▽

L2W



▽

R2W

FIG. 1 EXAMPLES OF RIGHT HAND (R), LEFT HAND (L) AND CENTRAL (C), SINGLE-AND DOUBLE-DRUM TRAWL WINCHES

3.5 Nominal Speed of Trawl Rope

Maximum hauling-in speed of a rope obtainable by the winch at drum load applied to the appropriate nominal rope winding diameter.

3.6 Nominal Trawl Rope Winding Diameter

3.6.1 Winding Diameter Full-length Rope

Diameter when the whole design length of the rope has been wound onto the drum, that is, diameter of the outermost layer of the rope.

3.6.2 Winding Diameter Half-length Rope

Diameter when half of the design length of the rope has been wound onto the drum.

3.7 Paying-out Speed of Trawl Rope

3.7.1 Paying-Out Speed under Regenerative Braking (or Equivalent Type of Braking)

Maximum paying-out speed of a rope obtainable by the winch at 0.5 drum load applied to the appropriate nominal rope winding diameter, while paying-out the rope by means other than a friction brake.

3.7.2 Paying-Out Speed under Friction Braking

Twice the nominal speed at 0.5 drum load applied to the appropriate nominal rope winding diameter, while paying-out the rope using the friction brake.

3.8 Single-drum Trawl Winch

Winch equipped with one main trawl rope drum (see Fig. 1: L1 or R1).

3.9 Single-drum Trawl Winch Side

3.9.1 Right-hand Winch

Winch where the reduction gear or the drum drive is on the right-hand side of the main drum, in relation to an observer situated on the side of the motor, power supply or controller.

3.9.2 Left-hand Winch

Winch where the reduction gear or the drum drive is on the left-hand side of the main drum, in relation to an observer situated on the side of the motor, power supply or controller.

4 DESIGN AND OPERATION

4.1 General Requirements

Trawl winches shall meet the general requirements for deck equipment as in IS 12719 and the specific requirements given in 4.2 to 4.12.

4.2 Auxiliary Equipment

4.2.1 Trawl winches may also be fitted with auxiliary drums and warping-ends; if these are fitted, their positions and characteristics shall be agreed between the purchaser and the manufacturer.

4.2.2 A spooling gear is to be fitted to the main drum in order to achieve uniform winding of the trawl rope, unless otherwise agreed between the purchaser and the manufacturer.

The auxiliary drums may also have spooling gears, if agreed between the purchaser and the manufacturer.

Provision shall be made for manual adjustment of any spooling gear fitted.

Mechanical spooling gear (if fitted) shall be designed to operate against the drum load, at fleet angles up to 6° per side in horizontal and vertical planes.

If the spooling gear is automatically driven, it shall be possible to disengage the spooling carriage. Subject to agreement between the manufacturer and the purchaser, the spooling gear shall be adaptable to wires or more than one diameter.

4.3 Control and Measuring Instruments

4.3.1 A trawl winch may have an instrument to measure the tension in the trawl rope, if agreed between the purchaser and the manufacturer. The equipment shall be capable of measuring the tension while the rope is being paid-out, hauled-in and when trawling the fishing gear. The measurement of tension may be replaced by the measurement of torque at the drum whilst trawling, if agreed between the purchaser and the manufacturer. It is recommended, for winches greater than nominal size 4 (see Table 1), that the tension shall be measured without contact of the measurement instruments (pick-up) with the trawl rope.

4.3.2 A trawl winch may be provided with an instrument to measure the length of paid-out trawl rope, if agreed between the purchaser and the manufacturer. Instrument error shall not exceed 0.15 percent of the trawl rope lengths.

4.3.3 A trawl winch may be provided with instruments to measure the electrical and/or hydraulic values as agreed between the purchaser and the manufacturer.

4.4 Signalling Devices

If agreed between the purchaser and the manufacturer, a trawl winch may be fitted with adequate signalling devices giving necessary information on:

- the winch and its components being ready for operation;

- b) which components of the winch are being operated;
- c) the engaging of clutches and/or drum brakes;
- d) failure of winch components;
- e) overload and other dangerous conditions, for example:
 - The trawl rope being down to the first layer on the drum while paying-out the fishing gear,
 - no release of the automatic brake,
 - allowable temperature of the electric motor winding being exceeded,
 - slipping of the trawl drum while trawling the fishing gear,
 - overloading of the spooling gear.

4.5 Protection

4.5.1 Overload protection of trawl winches shall be provided during hauling-in. It shall operate under overload not exceeding 1.5 times the value of drum load at the outermost layer of a trawl rope being fully wound onto the drum, unless a higher value is agreed between the purchaser and the manufacturer. A time interval protection device shall be fitted to overcome the transient overloads experienced in service. When the protection device of one has operated, the second winch shall stop simultaneously.

4.5.2 Facilities for paying-out the rope under conditions of winch overload, while still trawling the fishing net, shall be provided. For overloads up to 1.5 times the drum load at the outermost layer, a multistep or continuous control of such device shall be possible. If agreed between the purchaser and the manufacturer, the device may operate automatically in which case means of switching off the device shall exist. Brake release shall be provided as well, if agreed between the purchaser and the manufacturer.

4.5.3 Means protecting against paying-out of the whole length of a trawl rope from the main drum may be fitted. Not less than 20 windings of the trawl rope shall still remain wound onto the drum when such means have operated, unless otherwise agreed between the purchaser and the manufacturer.

4.5.4 An emergency means of stopping the winch shall exist. It shall be fitted at the winch position and at the remote control position, where such exists, and near the rope sheaves. For single-drum trawl winches, the single operation, where practicable, shall cause the stopping of both winches.

4.6 Control

4.6.1 Control Position

For each trawl winch, a local or remote control (or a combined remote and local control) shall be provided.

For single-drum trawl winches, separate control of each trawl winch shall be provided.

NOTE — The winches shall meet the requirements of Classification Societies or Statutory Bodies if local control is stipulated on trawl winches.

4.6.2 Direction of Motion of Operation Devices

The direction of motion of operating devices shall be such that the trawl rope or auxiliary rope is hauled-in by clockwise movement at a hand-wheel or crank handle or alternatively by movement of a hand-lever towards the operator. The direction of operation of all control handles shall be clearly and permanently marked.

4.6.3 Remote Control

By agreement between the purchaser and the manufacturer, the remote control shall provide operating conditions for simultaneous, common and synchronous operation on main drums.

4.7 Brakes and Braking

4.7.1 Brakes

Each winch shall have an automatic braking system which operates when bringing the operation device to zero, or to the braking positions, and also when there is no power supply on the winch. Means shall exist for manual release of the brake.

4.7.2 Selective Brake

Each declutchable drum of the winch shall have its own selective brake. The drum brake may also act as an automatic brake of normally closed type. The brake handle force during manual braking shall not exceed 0.25 kN.

4.7.3 Braking Torque

The total available braking torque shall be at least 1.5 times the design torque. The brakes shall be adjustable, unless otherwise agreed between the purchaser and the manufacturer.

4.7.4 Regenerative Braking

For regenerative braking, the rated load of the brakes shall be 0.5 times the design torque. In this case the paying-out speed of the trawl rope is related to the number of revolutions of the driving motor and its characteristics.

4.7.5 Friction Braking

The drum brake of a trawl winch when paying-out the rope shall be capable of absorbing the power at a torque equal to 0.5 times the design torque and at drum revolutions corresponding to twice the nominal speed. The power shall be absorbed for two periods equal to rope length multiplied by winch speed separated by 15 min. Cooling of brakes to meet this specification is acceptable. The use of friction braking does not exclude the use of regenerative braking.

4.8 Ambient Temperature

The winches shall be designed for satisfactory operation of their components at a temperature range within 10 to 45°C when located in enclosed compartments; a different lower limit may however be agreed between the purchaser and the manufacturer.

4.9 Material Stresses

The winch manufacturer shall be responsible for determining the strength requirements of the component parts of the winch to withstand all the loads of each nominal size of trawl winch respectively.

4.10 Basic Calculations

4.10.1 When a trawl winch with a trawl rope being wound on the outermost layer is loaded with the drum load, the allowed calculated stresses, based on simple elastic theory, of any part of the winch shall be not greater than 0.4 times the 0.2 percent proof stress of the material but not more than 0.28 times the breaking strength of the material.

4.10.2 The relevant parts of a winch and its fixing to the base plate shall be designed with due regard to the possibility of rupture of a trawl rope being wound on the appropriate nominal number of rope layers on the drum. In such a case, the allowed calculated stresses shall be not greater than 0.9 times and 0.2 percent proof stress of the material.

4.10.3 The relevant parts of a winch shall be designed taking into account the maximum torque of the prime mover and maximum braking torque. In such a case, the allowed calculated stresses shall be not greater than 0.8 times the 0.2 percent proof stress of the material.

4.10.4 The selection of design trawl ropes shall preclude the possibility of their rupture under loads derived from the winch prime mover.

4.11 Drum Design

The drum design shall comply with the safety requirements of the Classification Societies or Statutory Bodies.

4.11.1 Design Rope

For design purposes, the drum shall be based on the use of 6 × 24 steel wire rope in accordance with IS 2581.

NOTES

1 This rope has tensile grade 1570 N/mm², A-galvanized surface finish and fibre core.

2 The design requirement does not preclude the use of other types of ropes in service.

4.11.2 Drum Diameter

The drum diameter shall be not less than 14 times the design rope diameter.

4.11.3 Drum Flange Height

When all the rope is reeled, the flange shall project at least twice the rope diameter above the outermost layer, when spooling gear is fitted. When no spooling gear is fitted, the projection shall be at least 4 times the rope diameter.

4.11.4 Drum Clutch

The drums of double-drum trawl winches and of winches with auxiliary drums or warping-ends shall be of the declutchable type.

4.12 Drive Equipment

4.12.1 Electrical drives and control equipment shall conform to the requirements of IS 10242 (Part 1/Sec 1), IS 10242 (Part 2/Sec 1), IS 10242 (Part 2/Sec 2), IS 10242 (Part 3/Sec 1), IS 10242 (Part 3/Sec 2), IS 10242 (Part 3/Sec 12). Deck-mounted enclosures shall conform to IS 12063.

4.12.2 Hydraulic drives shall operate at a pressure 10 percent below the selected nominal pressure, if agreed between the manufacturer and the purchaser.

5 PERFORMANCE

5.1 The trawl winch shall be capable of fulfilling the characteristics specified in this Indian Standard and as indicated in Table 1.

5.2 Trawl winches shall have smooth speed control adjustment; stepped control is also allowed. The minimum hauling-in speed shall not exceed 15 m/min. When agreed between the manufacturer and the purchaser, the necessary special conditions for rewinding trawl rope shall be provided.

6 ACCEPTANCE TESTS

6.1 Rules Concerning Winch Acceptance Tests by Purchaser

Table 1 Design Data for Trawl Winches

(Clauses 3.4, 4.3.1 and 5)

Type	Nominal Size	Minimum Drum Load kN		Minimum Nominal Speed of Trawl Rope m/s	Design Rope Diameters mm	Design Length of Trawl Rope m	
		Full-length Rope (see 3.6.1)	Half-length Rope (see 3.6.1)			Min	Max
A	0.63	5	6.3	1	14	500	800
	1	7.5	10	1	14	500	800
	1.6	12	16	1	16	500	1 000
	2	16	20	1	16	800	1 200
	2.5	18.5	25	1.33	18	800	1 600
	3.2	25	31.5	1.33	20	1 500	1 800
	4	30	40	1.67	22	1 000	2 000
	6.3	47	63	1.67	24	1 250	2 500
B	8	60	80	1.67	28	1 500	3 000
	4.7	47	63	2	24	2 000	3 000
	6	60	80	2	28	2 500	3 500
	7.5	75	100	2	28	3 000	4 500
	9.4	94	125	2	28	3 000	4 500
	12	120	160	2	32	3 000	4 500
C	15	150	200	2	36	3 500	5 000
	9	63	85	1	24	1 000	1 500
	11	80	106	1	28	1 250	2 000
	17	125	166	1	28	1 500	2 500
	19	140	186	1	28	1 500	2 500
	21	160	212	1	32	1 500	2 500
	27	200	266	1	36	1 500	2 500

NOTES

1 The rope lengths and diameters quoted for design purposes in the table do not preclude the fitting of ropes of other qualities, diameters or lengths in service.

2 For appropriate use to types, it may be noted that:

- Type A is primarily intended for demersal fishing;
- Type B is primarily intended for deep water fishing; and
- Type C is primarily intended for pelagic fishing.

6.1.1 *No-load Test without the Use of the Rope*

In hauling-in and paying-out directions at nominal speed for 10 min and, where appropriate, with maximum speed for 1 min.

6.1.2 *Test of hauling-in of the trawl rope at approximately the design torque on the drum for approximately the full length of the trawl rope.*

6.1.3 *Test of hauling-in of the trawl rope at 125 percent of drum load on appropriate nominal rope winding diameter for 3 min with stopping and reversing.*

NOTE — The test specified in 6.1.2 and 6.1.3 may be carried out with equivalent weights. Interruptions are allowed.

The pull value, while carrying out the tests with a trawl

rope, may be determined depending on the layer of rope being wound in relation to that at the design torque.

6.1.4 *Each braking system shall be tested with 1.5 times the design torque applied to the winch drum.*

- a) Presence of abnormal temperature of bearings;
- b) Presence of abnormal noise;
- c) Power consumption;
- d) Minimum design hauling-in speed;
- e) Pressure values;
- f) Easy and satisfactory operation of components;
- g) Proper operation of spooling gear, if fitted;
- h) Operation of measuring instrument, if fitted;

- J) Operation of protecting devices, interlocks and switches, where practicable;
- k) Operation of signalling devices, where fitted; and
- m) Operation of controls.

6.2 The winch shall be subjected to final acceptance tests during mooring trials of the ship and/or during her fishing trials at sea, according to her test programme, to the extent agreed between the purchaser and the manufacturer.

7 DESIGNATION

Trawl winches conforming to this Indian Standard shall be designated by the following indications, in the order given:

- a) Denomination : trawl winch;
- b) Number of this Indian Standard 10277;
- c) Type of winch : E for electric, D for diesel, H for hydraulic, EP for external powered;
- d) Nominal size (according to Table 1);
- e) Side of winch (*see* Fig. 1) : C for central, R for right-handed, L for left-handed;
- f) Drum arrangement (*see* Fig. 1) : 1 for single-drum, 2 for double-drum in-line, 2W for double-drum waterfall;

- g) Number and, where applicable, position of auxiliary drum (AD) : R or 1 (*see* 4.2.1).
- h) Number and, where applicable, position of warping-ends : R or L (*see* 4.2.1); and
- j) Information on motive power : Voltage and frequency of electric current, or hydraulic fluid pressure and flow rate.

Example :

Designation of a trawl winch according to IS 10227, electro-hydraulic powered (H), of nominal size 12, right-handed (R), with double-drum waterfall (2W), with one auxiliary drum on the left and one warping end of the left, voltage 440 V and frequency 60 Hz.

Trawl winch Is 10227 H-12-R-2W01AD L-1L-440/60

8 MARKING

Trawl winches complying with this Indian Standard shall be permanently marked with the following information:

- a) Number of this Indian Standard : IS 10227;
- b) Nominal size (*see* 3.1).

Example : IS 10227 — 12.

ANNEX A

(*Clause 12*)

(For Guidance Only)

MECHANICAL CHARACTERISTICS OF WINCHES

If agreed between the purchaser and the manufacturer, the trawl winches may have a mechanical characteristic (revolutions, torque on the drum) corresponding to the constant output curve for hauling-in the net.

The maximum torque within the constant output curve

shall amount to not less than 1.5 times the design torque. In addition, it is recommended that the number of revolutions of the drum be increased by 1.5 times with respect to the number of revolutions at design torque when the torque decreases below the rated value with the constant output curve.

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards : Monthly Additions'.

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Amendments Issued Since Publication

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